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Selected Abstracts

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Outcome of Cardiorenal Syndrome 1 After Continuous Renal Replacement Therapy

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Objective: To evaluate the effect of continuous renal replacement therapy (CRRT) on the prognosis of cardio-renal syndromes (CRS) type 1.

Methods: We retrospectively analyzed the clinical data of 53 patients who were treated with CRRT for CRS type 1 between January 2008 to December 2015 in Beijing anzhen hospital, to assess the prognosis of these patients (death, out of RRT or rely on RRT) and its influencing factors. CRRT was performed by the form of s continuous veno-venous hemodiafiltration (CVVHDF) technique using a standard femoral vein catheter and sodium citrate or heparin anticoagulation. The ratio of dialysate to replacement fluid was 1:1 (replacement fluid volume 2 L/h). The ultrafiltration rate was 50–200 ml/h.

Results: There were 36 males and 17 females with an average age of 65.5 ± 15.2 years. The exclusion criteria were: cardiac shock, intra-aortic balloon pump and end stage renal disease. The primary cardiovascular diseases were: chronic heart failure 13 cases, acute myocardial infarction 22 cases, cardiomyopathy 11 cases, hypertension 4 cases, and rheumatic heart disease 3 cases. Hospital mortality was 43.4% (23/53). 21 of the 53 patients (39.6%) who did not need hemodialysis anymore after the CRRT treatment. The initiate time from onset of acute heart failure to the beginning of RRT was 0–22 days [4.43 ± 7.00 days]. The average duration of CRRT was 82.16 ± 73.90 h. Basic serum creatinine (Scr) (212.02 ± 131.57 vs. 128.93 ± 72.52 $\mu\text{mol/L}$, $P < 0.05$), diuretics using (69.6% vs 57.1%, $P < 0.05$), output of urine [313.78 ± 236.20 ml vs. 484.10 ± 298.31 ml, $P < 0.05$], CRRT initiate time [7.00 ± 9.59 days vs. 2.00 ± 1.35 days, $P < 0.05$] and inotropes and/or vasopressors using (57.1% vs 38.1%, $P < 0.05$) had significant difference between death group (23 patients) and out of hemodialysis group (21 patients); however, age, gender, history of CHF, diabetes and hypertension, useing of ACEI/ARB, B-type brain natriuretic peptide (BNP), left ventricular ejection fraction (EF) and left ventricular diameter (LVDH) had not significant difference between the two group. The patients had lower in-hospital mortality (27.6% vs 62.5%), lower percentage of rely on RRT (8.3% vs 24.1%), shorter duration of CRRT (57.05 ± 38.49 vs. 112.50 ± 93.75 h) and more liquid removal (6.05 ± 5.28 vs. 12.07 ± 11.02 L) in the early CRRT group (iniation of CRRT less than 2 days after onset of acute heart failure) when compared to the lately CRRT group (iniation of CRRT more than 2 days after onset of acute heart failure). Logistics regression analysis showed that only inotropes and/or vasopressors using was independent risk factors of death ($P < 0.05$).

Conclusions: The patients with CRS type 1 often require CRRT intervention. Early CRRT could rapidly reduce fluid overload, increase cardiac output and decrease mortality. Renal insufficiency, lately CRRT, or inotropes and/or vasopressors using affect prognosis of patients with type 1 CRS. Therefore, early CRRT, precise volume evaluation and hemodynamic monitoring can effectively prevent the occurrence of hypotension and improve survival rate.

Key Words: Cardiorenal syndrome 1; Continuous renal replacement therapy (CRRT).

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Epidemiology of Hospitalized Adult Patients with Acute Kidney Injury: A Single-Center Retrospectively Observational Study

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Objective: To investigate the incidence and diagnosis of acute kidney injury (AKI) in hospitalized adult patients.

Methods: All adult patients hospitalized from October 1, 2013 to September 30, 2014 in the first affiliate hospital of Nanjing Medical University were screened by the Lab Administration Network. All adult patients met KDIGO AKI criteria were enrolled. Demographic characteristics, laboratory examination, clinical data, clinical outcomes were recorded.

Results: The incidence of AKI was 1.6% (1401/87196). Patients with AKI stage 1, 2, 3 and renal replacement therapy (RRT) accounted for 38.0% (532/1401), 22.0% (309/1401), 40.0% (560/1401) and 16.3% (228/1401), respectively. The average age was 63.2 ± 37.2 and urban population made up 58.3%. The median length of hospital stay was 18 (11, 28) days and median cost was 57.2 (25.0, 121.6) thousand RMB. The 30-day mortality was 35.3%. Renal, other internal, surgery and ICU department accounted for 7.4%, 37.1%, 30.1% and 25.4% of the study patients. The timely diagnosis rate, delayed diagnosis rate and missed diagnosis rate were 44% (616/1401), 3.3% (46/1401) and 52.7% (739/1401), respectively. Patients hospitalized in renal department had the highest AKI diagnosis rate (89.3%, 88/103), while missed diagnosis rate of the surgical patients was as high as 75.1% (317/422).

Conclusions: AKI was characterized by high incidence, high short-term mortality and high missed diagnosis rate in hospitalized adult patients in our hospital. Electronic alert system for AKI was urgently needed for timely diagnosis and intervention.

Key Words: Acute kidney injury; Epidemiology; Diagnosis.

Clinical Observation of Hemodialyzer Reuse after Autologous-Blood Circulation as a Strategy for Preventing First-Use Syndrome

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Objective: To observe the clinical effect of preventing and decreasing first-use syndrome (FUS) by hemodialyzer reuse after circulation of residue blood in the post-hemodialysis circuit.

Methods: 51 patients, who had ever suffered from first-use syndrome with Gambro Polyflux-17 R hemodialyzer to different degrees from 2012 to 2015 in this center, were assigned into 3 groups. In control group A (pre-reuse group), the new dialyzer was reused through standard reuse procedure by 3.5% Renalin, and then preserved at 20°C for at least 11 hours before use; in control group B (dexamethasone circulation group), the blood circuit and dialyzer was sufficiently primed, and then cycled with 5 mg dexamethasone for 15 minutes before use. In experimental group C (reuse after autologous-blood circulation group), after blood returning of the last use of reused dialyzer, when the discriminator of the dialysis machine alarmed, the circuit was disconnected from the patient, and a new dialyzer was primed with residue blood in the circuit and cycled for 15 minutes, after that the dialyzer was reused through standard reuse procedure, and then preserved at 20°C for at least 11 hours before use. We observe the symptoms during hemodialysis, and if there was no symptom of FUS, the therapy was considered to be effective.

Results: Control group A (pre-reuse group): the effective rate was 52.94%; Control group B (dexamethasone circulation group): the effective rate was 64.7%; Experimental group (reuse after autologous-blood circulation group): the effective rate is 94.12%, obviously superior to the control groups, and there is a statistically significant difference.

Conclusion: Hemodialyzer reuse after autologous-blood circulation was significantly effective in the prevention of FUS. This therapy was easily operated, no extra waste of patient blood and which benefit clinical treatment.

Key Words: Hemodialyzer; Autologous-blood; Circulation; Reuse; Preventing; FUS.

Impact of Dilution Effect of Fluid Balance on the Early Detection of Cardiac Surgery Associated Acute Kidney Injury

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Objective: The volume overload of patients with cardiac surgery is common, which is closely related to the occurrence, development and prognosis of cardiac surgery associated acute kidney injury (CSA-AKI). Dilution effect of volume overload of cardiac surgery patients could delay early diagnosis of CSA-AKI. The purpose of the study was to investigate the effect of volume overload on the timing of diagnosis and prognosis of AKI with off pump coronary artery bypass grafting (OPCABG).

Methods: That was a retrospective analysis and single center study. 122 consecutive patients undergoing elective OPCABG from January to June 2015 in Zhongshan hospital were enrolled in this study. AKIN criteria was used to classify CSA-AKI. Fluid input and output were recorded for 48 hours post-operatively. Urine output was recorded every 6 hours for 24 hours post-operatively. Serum creatinine was daily recorded and adjusted for weight-corrected fluid balance and patients were categorized into three groups: group A (No AKI before or after adjustment); group B (AKI only after adjustment); group C (AKI both before and after adjustment).

Results: Among 122 patients with weight and baseline creatinine available, only 1 patient in group C received CRRT treatment and all patients were discharged successfully from hospital. After adjusting for weight and volume balance, the incidence of CSA-AKI increased from 18.8% (23/122) to 30.3% (37/122) ($p < 0.05$). In patients with AKI only after adjustment (group B), ICU stay and total hospitalization time were significantly higher than those in group A [(3.3 ± 0.9) d vs (1.8 ± 1.5) d, $p < 0.05$; (13.3 ± 3.7) d vs (11.3 ± 3.3) d, $p < 0.05$], however no significant difference was observed when compared with group C [(3.3 ± 0.9) d vs (2.5 ± 1.1) d, $p > 0.05$; (13.3 ± 3.7) vs (14.0 ± 2.5) d, $p > 0.05$]. Also, the mechanical ventilation time in group B was significantly longer than group A [(2.1 ± 0.6) d vs (1.3 ± 0.9) d, $p < 0.05$], but approximated that of group C ($p > 0.05$).

Conclusion: The dilution effect of volume overload in the patients with OPCABG could influence the level of serum creatinine concentration, which might delay early classification of AKI. In order to improve the sensitivity of detection of cardiac surgery associated AKI, serum creatinine should be adjusted according to the volume balance and basic weight level.

Key Words: Acute kidney injury; Fluid overload; Fluid balance; Cardiac surgery.

Decreased Serum Sclerostin Level Is Closely Related to Secondary Hyperparathyroidism in Prevalent Hemodialysis Patients

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Objectives: Sclerostin is a soluble regulatory factor of bone formation through inhibiting canonical Wnt signaling pathway. Recent research indicated that sclerostin might be involved in mineral and bone metabolism, however whether sclerostin play any potential role in chronic kidney disease-mineral and bone disorder was still uncertain. This study aimed to explore the relationship between circulating sclerostin levels and mineral disorders, especially secondary hyperparathyroidism in prevalent hemodialysis patients.

Methods: 175 prevalent hemodialysis patients were enrolled from April to October in 2014. Clinical and biochemical data were collected. Serum sclerostin levels were measured by ELISA. Secondary hyperparathyroidism was determined as serum iPTH level above nine times upper normal limit.

Results: The median serum sclerostin level was 160.50 pmol/L (interquartile range 100.67–256.39 pmol/L) in prevalent hemodialysis patients. Univariate correlation showed serum sclerostin levels positively correlated with age, BMI, serum calcium, 25(OH)VitD levels, and negatively with spKt/V and iPTH levels. Serum sclerostin levels were significantly lower in patients with secondary hyperparathyroidism. Forward logistic regression analysis showed that age (OR = 0.937, 95% CI = 0.900–0.977, $p = 0.002$), dialysis vintage (OR = 1.011, 95% CI = 1.002–1.019, $p = 0.015$), AKP (OR = 1.023, 95% CI = 1.012–1.035, $p < 0.001$), serum phosphate levels (OR = 3.118, 95% CI = 1.028–9.460, $p = 0.045$), serum calcium (OR = 13.421, 95% CI = 1.245–144.727, $p = 0.032$), IgSclerostin levels (OR = 0.077, 95% CI = 0.011–0.560, $p = 0.011$) were the independent risk factors for the presence of secondary hyperparathyroidism in prevalent hemodialysis patients.

Conclusions: Decreased level of serum sclerostin was an independent risk factor for secondary hyperparathyroidism in prevalent hemodialysis patients.

Key Words: Sclerostin; Hemodialysis; Secondary hyperparathyroidism.

Molecular Mechanisms of Isoform-Specific PKCs Activation in Uremic Accelerated Atherosclerosis

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Objective: Uremic accelerated atherosclerosis (UAAS) is the most common complication and the leading cause of death in end stage renal disease (ESRD) patients. Protein kinase C (PKC) is a family of homologous serine/threonine kinases which has at least 10 isoforms. Studies have shown that PKCs activation and its signaling pathways played important roles in atherosclerosis (AS) formation and development. However, the effect and the molecular mechanism of PKCs in the UAAS was still unclear. Our study was aimed at identifying the effect and the molecular mechanism of isoform-specific PKCs activation in UAAS.

Methods: 66 chronic hemodialysis (CHD) patients from the Department of Blood Purification of Beijing Chao-Yang Hospital, Capital Medical University in January, 2016 were enrolled in this study. The inclusion criteria were age ≥ 18 years old, without residual renal function, and maintenance hemodialysis ≥ 3 months. Patients were excluded if they had acute cardiovascular events within one month, complicated with autoimmune disorders or acute infection. 66 CHD patients were divided into two groups according to the results of carotid artery intima – media thickness (IMT) measured by color Doppler ultrasound (The AS diagnostic criteria is $IMT \geq 1.2$ mm.), CHD patients without atherosclerosis (CHD group, $n = 30$, 18 males and 12 females, aged 47.3 ± 11.9 years, duration of dialysis was 42.7 ± 17.8 months) and CHD patients with atherosclerosis (CHD + AS group, $n = 36$, 19 males and 17 females, aged 47.2 ± 12.5 years, duration of dialysis was 45.0 ± 17.7 months). Meanwhile, 30 healthy subjects with sex and age-matched were randomly selected to serve as normal controls (Control group, 15 males and 15 females). Western blot was performed to detect the membrane translocation and activation of isoform-specific PKCs and the phosphorylation of Akt in peripheral blood mononuclear cells. ELISA was performed to detect VCAM-1 and ICAM-1 levels in plasma.

Results: (1) There was no significant difference in the items, such as age, gender, dialysis age, smoking, diabetes, Kt/V, hemoglobin, serum creatinine, blood urea nitrogen, cholesterol and triglycerides, etc. between CHD group and CHD + AS group. (2) Compared with normal control group, PKC β and PKC δ activation increased significantly in peripheral blood mononuclear cells in CHD group, and more significantly in CHD + AS group ($P < 0.05$); meanwhile, compared with normal control group, PKC ϵ activation decreased significantly in peripheral blood mononuclear cells in CHD group, and more significantly in CHD + AS group ($P < 0.05$). (3) Compared with normal control group, Akt phosphorylation level

decreased significantly in peripheral blood mononuclear cells in CHD group, and more significantly in CHD + AS group ($P < 0.05$). Meanwhile, compared with CHD group, VCAM-1 and ICAM-1 levels in plasma increased significantly in CHD + AS group ($P < 0.05$).

Conclusions: PKCs may participate in the development of UAAS by mediating Akt signaling pathways activation and regulating the downstream VCAM-1 and ICAM-1.

Key Words: Uremic accelerated atherosclerosis; Hemodialysis; Protein kinase C.

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Effectiveness of Niacinamide Used on Hyperphosphatemia Patients Undergoing Hemodialysis

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Objective: To study the effectiveness of niacinamide in treating maintenance hemodialysis patients with hyperphosphatemia.

Methods: It was a prospective and randomized controlled trial. Patients with hyperphosphatemia (serum phosphate >1.45 mmol/L) were randomly assigned into two groups: control group (continue their original Phosphate binder and Rocaltrol treatment) and niacinamide therapy group (additionally received niacinamide, titrated from 600 mg/d to 1200 mg/d). The treatment lasted for 8 weeks. Serum phosphate and calcium were tested every 2 weeks. Normalized protein catabolic rate and other relevant indexes were tested monthly.

Results: 100 patients were recruited and 93 of them completed the trial, including 44 from the therapy group and 49 from the control group. By the repeated measurement analysis of variance, changes of serum phosphate in two groups displayed a statistical significant difference, but the levels of serum calcium in both remained steady. At the end of trial, compared to control group, therapy group appeared decreased serum phosphate levels [(1.59 ± 0.36) mmol/L vs. (1.94 ± 0.25) mmol/L, $P < 0.02$] and increased serum HDL levels [(1.32 ± 0.54) mmol/L vs. (1.09 ± 0.41) mmol/L, $t = 2.37$, $P = 0.02$]. Meanwhile, two groups showed no significant difference in intact parathyroid hormone and alkaline phosphatase. Adverse reactions including thrombocytopenia and gastrointestinal dysfunction were observed in niacinamide therapy group.

Conclusions: Niacinamide was effective on controlling hyperphosphatemia along with phosphate binder in maintenance hemodialysis patients. It also increased the serum HDL levels. Nonetheless, it was important to monitor the number of platelet.

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The Effect of Improving Self-Care Ability of Maintenance Hemodialysis Patients on the Quality of Life of Main Caregivers

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Objectives: In order to know about influence of self-care ability of maintenance hemodialysis (MHD) patients on the quality of life (QOL) of the primary caregivers we investigated self care ability of MHD patients. To give some advice and targeted intervention strategies, We discussed whether the QOL of main caregivers could be improved by improvement of self-care ability in MHD patients.

Methods: 100 patients and their main caregivers in our center were randomly chosen as study subject among all MHD patients who met the criterion. The 100 MHD patients were assessed through questionnaire of self-care ability and they were divided into two groups, one group of normal self-care, the other group of poor self-care. The QOL of main caregivers were assessed through SF-36. We make individualized and targeted nursing interventions among patients of poor self-care ability. After 12 weeks, these patients were assessed with questionnaire of self-care ability in order to find the patients with improvement of self-care ability among the poor self-care ability group. At that time, we assessed main caregivers of patients got improvement of self-care ability and main caregivers of patients with normal self-care ability through SF-36 again.

Results: The patients with score of self-care ability ≥ 90 were in normal self-care group and < 90 were in poor self-care group. There were 53 patients in normal self-care group and 47 in poor self-care group in our study. The QOL score of main caregivers in poor self-care group was significantly lower than normal self-care group (96.6170 ± 20.6761 vs. 108.6415 ± 24.9207 , $t = 2.6064$, $P < 0.01$). 72% of patients in poor self-care group improve self-care ability after nursing intervention (score ≥ 90). There were no significant differences of QOL between main caregivers of patients got improvement of self-care ability and main caregivers of patients with normal self-care ability (109.1212 ± 19.1568 vs. 108.6415 ± 24.9207 , $t = 0.0945$, $P > 0.05$).

Conclusions: Caregivers of MHD patients should spend a lot of time and energy on diet caring, fistula maintenance, intake and output monitoring, medication using. They also need to deal with various psychological problems of their patients. MHD patients received hemodialysis treatment several times a week and they need care from caregivers on their way to and from dialysis care. As a member of society, caregivers also engaged in work, study and were under pressure of employment, marriage, economy. In the increasingly competitive society today, caregiver inevitably produce physiological, psychological, social burden and so on. Thus, their QOL were affected seriously. In this study, we provide targeted nursing intervention in poor self-care group and found that self-care ability of these patients were improved. At the same time, the QOL of their main caregivers were also improved. Thus, improving the patient's self-care ability was necessary.

Key Words: Hemodialysis; Patients; Self-care ability; Caregivers; Quality of life.

Study on the KPI Management Mode Affecting the Quality of Peritoneal Dialysis Centre Management

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Objective: To discuss how KPI (key performance indicator) management model affect the quality of peritoneal dialysis center management.

Methods: Using self-control method. 388 peritoneal dialysis patients were enrolled to the before KPI group in January 2014. 440 peritoneal dialysis patients were enrolled to the KPI group in January 2015. The before KPI group used the routine nursing management mode such as advising the PD patients to limit salt and water intake, providing nutritional guidance, exchanging technique instructions, helping the PD patients how to prevent the exit infection and peritoneal dialysis related peritonitis and giving rehabilitation guidance and so on by the charge nurse. In the KPI group, the charge nurse used negotiated nursing management with patients and patients' families. In the KPI group the charge nurse set therapeutic targets, include incidence of infectious complications, the level of hemoglobin, serum albumin, calcium, phosphorus and serum sodium, attainment rate and the time, etc. When the patient came to our clinic to have follow-up examinations, the charge nurse gave these assessments, compared last laboratory results and the goal, then evaluated and checked, confirmed the care plan implementation and the next therapeutic targets, step by step, finally achieved the standard goal. We use the KPI management model one year (till January 2016), then compare the two groups in the incidence of peritoneal dialysis-related peritonitis, exit rate, continued treatment time (TOT), the standard rate of hemoglobin, serum albumin compliance rate, serum sodium compliance rate.

Results: (1) 388 cases of patients were enrolled to the before KPI group, 214 cases were male, 174 cases were female. The 388 patients Aged 18–75 years old, 45–65 years old accounted for 49.6%. The KPI group enrolled 440 patients, 248 cases were male, female were 192. The 440 patients aged 18–75 years, 45–65 years of age accounted for 50.1% of the patients. The numbers, sex, age and the primary disease of the two groups are not statistically different. After the implementation of KPI management mode, the hemoglobin compliance rate of our center rose from 30.95% to 33.33%, the serum albumin compliance rate rose from 14.63% to 37.79%, calcium compliance rate rose from 34.15% to 40.35%, phosphorus compliance rate rose from 57.32% to 61.99%, sodium compliance rate rose from 81.16% to 86.63%. (2). The two groups of patients in BMI rose from 43.75% to 48.08%, compliance rate of blood pressure rose from 14.6% to 32.6% and compliance rate of serum sodium rose from 81.16% to 86.63%. (3). Peritoneal dialysis-related peritonitis incidence rate decreased from 72.8 per patients month to 121 per patients month. CAPD patients quit rate was significantly reduced, from 13.1% to 10.4%. Continued treatment time of exited patients rose from 32 months to 35.6 months, which took consistent with the several major improvements in KPI.

Conclusion: KPI management mode can help us to improve the quality of PD centre management.

Key Words: Key performance indicators; Peritoneal dialysis; Quality of management.

Observation on the Effect of Modified Tunnel Needle for Exit-Site Healing after Catherization for Peritoneal Dialysis

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Objective: Analyze the application of modified tunnel needle in the catherization for peritoneal dialysis (PD), and observe its effect on operative incision healing.

Methods: 183 cases of patients in CKD stage 5 which need catheterization for PD in our hospital from December 2012 to December 2015 were selected and randomly divided into two groups. The control group used the common tube tunnel needle; the experimental group used the modified tunnel needle. Considering that the common tunnel needle often encountered resistance when guiding the PD tube out of the skin and which was easy to be detached or cause bleeding, our department improved the design of tunnel needle. The end of needle bar was improved into a conical transition portion, the sectional radius of which increased gradually from the front to the end of the needle bar, while the maximum radius was consistent with the radius of PD tube fixed in the catheter fixing groove at the end of the tunnel needle. The modified tunnel needle effectively reduced the resistance encountered by the PD catheter during puncture, mean while the PD tube was not easy to fall off from the tunnel needle, and all of these made the operation more smoothly and reduced the damage to subcutaneous tissue. This design had been declared for a national utility model patent (Patent No. ZL201320788782.0). All the operations were carried out by the fixed physician, and CAPD started two weeks after operation. Special attention was paid to the fixation of exit catheter to prevent pulling, with wound dressing changed by the fixed physician within two weeks. Training on the PD knowledge had been provided by the professional nurse, and two weeks later the patient took care of the exit site by him/herself. The number of exit-site bleeding, exit-site infection and tunnel infection after operations were observed and recorded. During outpatient follow-up, we used ISPD exit site scoring system, and those cases which were scored above 4 points or with purulent discharge were treated as exit-site infection. Erythema, edema or tenderness at subcutaneous tunnel skin were treated as tunnel infection, which were followed by ultrasonic diagnosis. The observation period was 6 months.

Results: During the observation period, besides the mechanical injury caused by pulling of short external tube, among the 91 cases of control group, there were altogether 15 cases with exit-site complications, 4 cases of exit-site bleeding and 11 cases of exit-site infection (3 cases of which combined by tunnel infection) were included; among the 92 cases of experimental group, there were altogether 5

cases with exit-site complications: 1 case of exit-site bleeding and 4 cases of exit-site infection (1 case of which combined by tunnel infection) were included; through Chi-square test, difference between the two groups were of statistical significances ($P < 0.05$).

Conclusion: The use of modified PD tunnel needle could reduce the occurrence of exit-site bleeding, exit-site infection and tunnel infection, and promote the healing of exit site. Exit-site infection may result in an increased occurrence of peritonitis which is a common reason of PD extubation or even quitting from PD. The improved tunnel needle is more smooth for use during surgery operation, which can prevent intraoperative injury, reduce exit-site complications, and was worthy of clinical use.

Key Words: Peritoneal dialysis, Modified tunnel needle, Exit-site healing, Catherization.

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Lysine Methylation Transferase SET8 Regulates the Transition of Vascular Smooth Muscle Cells to Osteoblast-Like Cell

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Objective: Vascular smooth muscle cells (VSMC) transition to osteoblast-like cell plays a key role in many pathological process associated with vascular calcification. It is reported that lysine methylation transferase SET8 is involved in cell transdifferentiation. Therefore, the aim of the present study was to investigate whether SET8 regulates the transition of vascular smooth muscle cells to osteoblast-like cell.

Methods: RASMCs were isolated from the thoracic aorta of adult male SD rats. Transfection was performed with cationic lipid vectors (LipofectamineTM2000). The transfection efficiency was observed by fluorescence confocal microscopy. The effective shRNA sequences were screened by Western blot. After transfection with effective siRNA sequences, the cells were randomly divided into three groups including control group, blank plasmid group and SET8-siRNA group. The expression of RUNX2 was detected by RT-PCR. The gray value of all RT-PCR and Western blot bands was analyzed by AlphaView SA image analysis system, and the gene expression was defined as purpose genes/internal gene. All statistical analyses were performed using the SPSS13.0 software (SPSS Company, Chicago, IL, USA). For all the statistical tests, $p < 0.05$ was considered statistically significant.

Results: Western blot shows that after transfection plasmid 48 h, the expression of SET8 in control group, blank plasmid group and SET8-siRNA group was 0.593 ± 0.039 , 0.588 ± 0.022 and 0.314 ± 0.042 respectively. Compared with control group and blank plasmid group, the expression of SET8 decreased in SET8-siRNA group ($P < 0.05$). RT-PCR shows that after transfection plasmid 48 h, the expression of RUNX2 mRNA in control group, blank plasmid group and SET8-siRNA group was 0.322 ± 0.015 , 0.221 ± 0.010 and 0.991 ± 0.118 respectively. Compared with control group and blank plasmid

group, the expression of RUNX2 mRNA increased in SET8-siRNA group ($P < 0.05$).

Conclusion: Our datas show that interference SET8 gene expression can promote VSMCs to transform to osteoblast-like cell, and SET8 may involve in regulating vascular calcification.

Key Words: Rat vascular smooth muscle cells; SET8; Transition; RUNX2.

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Akt/mTOR Signalling Is Involved in VSMC Calcification Induced by High Phosphate

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Objectives: The aim is to characterize the possible role of AKT/mTOR signalling in the vascular smooth muscle cells (VSMC) calcification induced by high phosphate.

Methods: Passage 3 to 5 of VSMC were used for experiments. VSMC were divided into two groups: normal phosphate group (Pi 1.3 mmol/L) and high phosphate group (Pi 2.6 mmol/L). Cbfa1 and OPN mRNA levels were determined by Real-Time PCR. p-Akt (ser473), p-mTOR (S2448), Cbfa1 and OPN protein expressions were quantified by Western Blot. When p-Akt and p-mTOR expression of VSMC were enhanced by high phosphate, Akt/mTOR inhibitors were respectively added in high phosphate group. VSMC then were divided into seven groups: high phosphate group (Pi 2.6 mmol/L); high phosphate + Wortmannin (10, 50, 100 nmol/L); high phosphate + rapamycin (1, 10, 100 ng/ml). After 24–48 h, Cbfa1 and OPN mRNA levels were determined, and p-Akt, p-mTOR, Cbfa1 and OPN protein expressions were quantified. All experiments were repeated 3 times. Calcium deposition was visualized by Alizarin stain method at day 7–14.

Results: After 7 days, compared with normal phosphate group, calcium deposition was obvious in high phosphate group. Cbfa1 and OPN mRNA expressions were significantly increased and the expressions of p-Akt/p-mTOR, Cbfa1 and OPN protein were significantly increased in high phosphate group ($P < 0.05$). Cultured for another 7 days, calcium deposition was significantly decreased in high phosphate + Wortmannin (50, 100 nmol/L) groups and high phosphate + rapamycin (100 ng/ml) group, compared with high phosphate group. After 24–48 hours, Cbfa1 and OPN mRNA expressions were significantly decreased; p-Akt, p-mTOR, Cbfa1 and OPN protein expressions were significantly decreased in high phosphate + Wortmannin (50, 100 nmol/L) and high phosphate + rapamycin (10, 100 ng/ml) groups ($P < 0.05$) compared with high phosphate group.

Conclusions: AKT/mTOR inhibitors, may suppress VSMC calcification and expressions of p-AKT/p-mTOR, Cbfa1 and OPN. Akt/mTOR is involved in VSMC calcification induced by high phosphate.

Key Words: Vascular calcification; Phosphate uptake; Signaling.

Malnutrition and Low Handgrip Strength Predict All-Cause Mortality Risk in Hemodialysis Patients

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Objective: Malnutrition and muscle wasting are closely related to mortality risk in patients with hemodialysis (HD). Subjective global assessment (SGA) is the most commonly used method to evaluate the nutritional status. Direct measurement of muscle mass has many limitations, but examining the handgrip strength (HGS) is relatively simple, safe and noninvasive. This study aims to analyze the correlation between the SGA score, HGS and mortality risk in HD patients.

Table 1. Demographics of the enrolled HD patients

Characteristics	Value (ratio %)
Number of patients	116
Age (mean, m)	57.8±14.8
Gender (male/female)	69/47
Cause of ESRD	
Chronic glomerular nephritis	63 (54.3%)
Diabetes	24 (20.7%)
Hypertension	7 (6.0%)
Other causes	22 (19.0%)
Dialysis vintage (m), median (range)	70.5 (5, 212)
Height (m)	1.65±0.08
Dry weight (Kg)	64.53±0.14
BMI	23.76±4.15

ESRD, end stage renal disease; BMI, Body mass index.

Table 2. Comparisons of indexes between the survival group and the death group

Indexes	Survival group (105)	Death group (11)	Test statistics*	p
Albumin (g/L)	39.85±2.50	39.16±3.03	0.719	0.398
Potassium (mmol/L)	4.97±0.87	4.75±0.52	0.702	0.404
Sodium (mmol/L)	142.33±3.08	141.53±3.04	0.665	0.416
Age (m)	56.90±14.81	66.45±12.25	4.262	0.041 [#]
Dialysis vintage (m)	70.30±47.39	80.55±48.78	0.463	0.498
BMI	23.58±3.80	25.42±6.70	1.973	0.163
HGS	31.70±12.37	22.45±12.00	5.593	0.020 [#]
MAC	28.97±3.75	28.08±6.32	0.476	0.492
TSF	21.57±7.58	20.41±9.41	0.223	0.637
MAMC	22.19±2.55	21.67±4.30	0.354	0.553
SGA (malnutrition/all)	4/105	4/11	12.179	0.001 [#]

BMI, Body mass index; HGS, handgrip strength; MAC, upper arm circumference; TSF, triceps skinfold thickness; MAMC, arm muscle circumference. * Including F test and chi-test; [#] Statistical significance.

Table 3. Multivariate Cox regression analysis

Indexes	B	Significance	Exp (B)	95.0% confidential interval	
				Lower limit	Upper limit
SGA	1.178	0.047 [#]	3.248	1.015	10.394
Age (>80 years)	1.628	0.028 [#]	5.094	1.194	21.725
MAC	0.102	0.503	1.108	0.821	1.495
TSF	0.017	0.844	0.984	0.834	1.160
HGS	0.125	0.031 [#]	0.882	0.788	0.988

SGA, Subjective global assessment; MAC, upper arm circumference; HGS, handgrip strength; TSF, triceps skinfold thickness. [#] Statistical significance.

Fig. 1. Kaplan-Meier survival curves for HD patients with normal nutrition and malnutrition according to their SGA.

Methods: This study was a prospective observational cohort study. Chronic HD patients were recruited in Peking University People's Hospital HD unit. Patients' demographics, primary cause of end stage renal disease (ESRD) were collected. Body mass index (BMI) was calculated. HGS, upper arm circumference (MAC), triceps skinfold thickness (TSF), arm muscle circumference (MAMC) were measured pre-dialysis. And serum albumin, serum potassium, serum sodium level and SGA were assessed. Patients' nutritional status was divided into 3 grades according to the SGA score. Grade A was for the normal nutrition level; grade B for mild and moderate malnutrition; and grade C for severe malnutrition. Grade B and C were combined as malnutrition for analyzing. Patients were followed up for 2 years.

Results: A total of 116 HD patients were included in the study with 69 males and 47 females. The average age of the patients was 57.8 ± 14.8 years (Table 1). Mean follow-up was 22.7 ± 3.8 months. At the end of follow-up, 11 patients died (9.5%), 1 case got renal transplantation, 2 patients were transferred to other units and the remaining 105 patients survived. The average age for the death group was 66.5 ± 12.3 years old with an average HGS (22.5 ± 12.0) Kg. While, in the survival group the average age was (56.9 ± 14.8) years with an average HGS (31.7 ± 12.4) Kg. The incidences of malnutrition were 36.4% and 3.8% respectively in the death group and the survival group which had significant difference. The cumulative survival of patients with normal nutrition and malnutrition, as shown in Figure 1, was determined by SGA. The cumulative survival for malnutrition patients was poor. There was no significant difference in dialysis vintage, albumin level, serum potassium, serum sodium, dry weight, BMI, MAC, TSF, MAMC, etc. (Table 2). Multivariate Cox regression analysis showed that malnutrition (HR 3.25, 95%

CI 1.02–10.39, $P = 0.047$) and older age (HR 5.09, 95% CI, 1.19–121.73, $P = 0.028$) increased mortality risk. While, HGS was a protective factor (HR 0.882, 95% CI negative 0.788–0.988, $P = 0.031$) (Table 3).

Conclusions: SGA assessment of malnutrition, low HGS are risk factors for mortality in chronic HD patients.

Key Words: Hemodialysis; Malnutrition; Subjective global assessment (SGA); Handgrip strength (HGS); Mortality.

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Peritoneal Dialysis Investigation of 166 Cases and Research on Factors of PD-Related Peritonitis

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Objective: To investigate the family caring support, the environment and sanity, the life quality and family economic burden to afford the medical expenses of the 166 peritoneal dialysis patients, we discussed about the risk factors for peritonitis taking place in patients accepting peritoneal dialysis.

Method: Questionnaire on peritoneal patients who underwent the peritoneal dialysis in our center for at least 3 months and followed up steadily with regularly evaluating results for their dialysis effects. Combined with the patients' personal clinical information, including the results of experimental tests, the follow-up evaluation on dialysis, and the total occurrence of peritonitis, related statistics were analyzed to find out risk factors for peritonitis.

Results: 1. The family caring support of PD patients

75.2% of the investigated patients were married. Patients looked after by their spouse took the percentage of 41.8%. Of all the investigated patients, self-cared reached the rate of 31.5%. The remained patients took care from their children or their house-keepers. Almost all the carers received the education of high school or above. Job was not affected in 67.3% of the patients' carers.

2. The environment and sanity of PD patients

As high as 83.0% of the patients operated peritoneal dialysis by themselves. Up to 98.2% of the patients washed their hands before operating peritoneal dialysis. The majority of PD patients' living area concentrated on 30–60 (23.3%) and 60–90 (26.4%) m², as most family had a small scale (71.1% held 2–3 people).

3. The life quality and family economic burden of PD patients

Most of the PD patients participated in social work (78.5%). The economic condition of PD family mostly was of average or below (86.7% annually under 100 thousand RMB), with the coverage of 98.8% on medical insurance. Those who considered that medical expenses had a rather small or relatively small effect on family economy occupied totally 62.3%. Still over 1/3 of the PD patients suffered the relatively large expenses caused by peritoneal dialysis.

4. Comparisons between peritonitis and non-peritonitis group of above

Compared with the non-peritonitis, the peritonitis group had longer duration of peritoneal dialysis ($Z = -6.796$) ($P < 0.001$), higher value of kt/v and CCR ($Z = -2.174$) ($P = 0.030$), as well as higher rate of involvement in social work and study ($Z = -2.286$) ($P = 0.022$).

5. LOGISTIC proportional hazards model analysis in risk factors for peritonitis

Elder age at the beginning of PD (OR = 1.054) (95% CI: 1.007–1.104) (P = 0.025) and higher blood level of 25-OH-D3 (P = 0.033, 95% CI: 1.003–1.090 (OR = 1.045) correlated with the incidence of peritonitis. However larger influence of PD expenditure on family economy had a negative correlation with peritonitis rate (OR = 0.371) 95% CI: 0.149–0.923 (P = 0.037).

Conclusion: The family caring support, the environment and sanity, the life quality of the PD patients in our center were basically in good condition, PD expenses were acceptable to most of the PD families. Old age at the beginning of PD, the high blood level of 25-OH-D3 before PD were the risk factors for PD related peritonitis. Opinions that PD treatment cost quite much on family economy protected PD patients from having peritonitis. More involvement in social life (normal attendancy on job and study), Long PD duration, and insufficient peritoneal clearance of toxic solutes also contributed to the presence of peritonitis.

Key Word: Peritoneal Dialysis; Peritonitis; Investigation.

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Clinical Value of the APACHE II Prognostic System Combined with Serum ChE Concentration in Assessing the Condition of Maintenance Hemodialysis Patients

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Objective: To investigate the value of acute physiology and chronic health status score and choline esterase (ChE) concentration in evaluating the condition and prognosis of patients with maintenance hemodialysis.

Methods: The research subject were the patients of first-grade nursing, seriously ill or terminally ill in maintenance hemodialysis (hemodialysis time ≥ 3 months). The single endpoint was discharged from the hospital or clinical death. The overall research deadline is June 30, 2016. A total of 157 patients were included, of which 94 were male and 63 were female. Minimum age 19 years old, maximum age 88 years old, average age (63 + 16) years old. The 157 cases were treated with the worst parameters to complete the APACHEII within 24 h. Peripheral venous blood (2–3 ml) was collected, and the concentration of ChE was measured. The prognosis of the patients were recorded and divided into survival group (104 persons) and death group (53 persons). The APACHE II score and ChE concentration were compared between the two groups. The prognosis of patients (survival: 0, died: 1) were correlated with APACHE II score and ChE concentration, and logistic regression analysis was performed, then calculate the relative risk (OR), and find the combination of the two logistic regression curve transformation parameter LGREGR-Pred 1, finally draw the ROC curve.

Results: The APACHE II score of the survival group was, significantly lower than the death group (32.75 ± 4.19 vs. 45.47 ± 4.69

($P < 0.01$). The survival group ChE concentration was significantly higher than that of the death group [(4629.59 ± 1447.68) U/L vs. (3910.77 ± 1971.62) U/L, $P = 0.01$]. APACHE II score (OR = 1.324 95% CI 1.233–1.603, $P < 0.01$) and ChE concentrations (OR = 0.979 95% CI 0.977–0.989, $P < 0.01$) were statistically significant in logistic regression analysis with different prognosis. APACHE II score and serum ChE concentration can reflect the severity of the disease and the prognosis of MHD patients, the increase of APACHE II score and the decrease of serum ChE concentration can indicate the severity of the disease. The AUC of APACHEII score and the concentration of ChE were 0.861 and 0.824, respectively, there was no significant difference between the two groups ($P > 0.05$), suggesting that the difference was not significant in predicting the severity and prognosis. However the two joint prediction AUC was 0.912, the accuracy of the prediction was better than that of any one of them. The results indicate that the combination of the two was helpful to increase the accuracy of judging the severity and prognosis of the patient's condition.

Conclusion: APACHE II score and ChE concentration were significantly correlated with the severity and prognosis of patients with MHD, the combination of the two factors can significantly improve the accuracy of MHD prognosis.

Key Words: MHD; Prognosis; APACHE II score; ChE.

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The Usage of Low Dose Argatroban Combined with Citrate in CRRT as the Given Anticoagulant Therapy with Poor Efficacy – A Self-Control, Prospective, Observational Study

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Objective: Preliminary observation of the anticoagulation effect and safety of using low dose of argatroban combined with citrate when the original method of anticoagulation had poor effect in continuous renal replacement therapy (CRRT).

Method: Sep, 2015–Jul, 2016, 12 patients diagnosed AKI needed CRRT from ICU, Jinling Hospital (Nanjing, China), were enrolled in this self-control, prospective, observational study. The prescription of original anticoagulation therapy is low molecular weight heparin (LMWH) 20–50 IU/kg at bolus, 5 IU/kg/h as maintenance, combined with 13% trisodium citrate 50–60 ml/h. Time to replaced by argatroban 30–50 ug/kg at bolus and 0.1–0.3 ug/(kg.min), if the given dose of LMWH is not enough to maintain the desired effect (filter life) (12 hr). All the anticoagulants pre-mentioned was administered intravenously before the filter. We keep modality of CRRT (CVVH pre-dilution/ CVVHD), catheter, blood flow rate (BFR), replacement fluid/dialysate rate (2–4 L/hr), type of filter and dose of citrate unchanged after the switch of anticoagulant therapy. The primary outcome measure was the differences between filters life before/after the switch of anticoagulation therapy. The other observation included bleeding events within

72 hr, changes of coagulation status and blood cell counts after the switch.

Results: 12 patients were enrolled in present study, Median of age was 39.5 years (interquartile range, 28.25–50.50). Three of them are female. 11 patients were diagnosed severe acute pancreatitis (SAP), 1 patient with an ICU admission diagnosis of rhabdomyolysis. 9 patients were treated with CVVH (pre-dilution), 3 patients left were treated with CVVHD; Replacement fluid/dialysate rate was 4000 ml/h in most of participants (n = 10). 4 types of filter been used during present study, including Acute M (n = 10), UT1100 (n = 1), 19 H (n = 1) and AV600 (n = 1). The median doses of anticoagulants adjusted by body weight was LMWH 38.2 IU/kg (interquartile-range, 28.81–43.98) at bolus and 3.5 IU/kg/h (interquartile range, 2.74–4.40) as maintenance, argatroban adjusted by body weight was 38.96 ug/kg (interquartile range, 30.75–56.18) at bolus and 0.12 ug/(kg.min) (interquartile-range, 0.06–0.19) as maintenance, respectively. The maintenance dose of 13% trisodium citrate was the same as 50 ml/h (interquartile-range, 45–50) before/after the anticoagulation therapy switch. The survival analysis of filters life was present by kaplan-Meier method, suggested an increasing after LMWH replaced by argatroban (median filter life 10 h vs. 33.5 h, $p < 0.001$). In Wilcoxon signed-rank test, analysis results of our data suggested no statistical changes in coagulation status (including APTT, PT, INR, Fbg, AT-III and D-dimer) after the replacement of anticoagulant. Meanwhile, the blood cell counts were not changed either (including of HGB, WBC and PLT). No bleeding events and liver function (DBIL, IBIL, ALT and AST) abnormal were recorded during follow up. With the ongoing CRRT, Scr (median, 181 vs. 164 $\mu\text{mol/L}$, $p = 0.01$) and BUN (median, 11.2 vs. 6.8 mmol/L , $p = 0.01$) decreased through the whole observation period.

Conclusion: Given the results of this observational study at early stage, low dose of argatroban combined with citrate might be an appropriate choice to replace LMWH combined with citrate as routine anticoagulation therapy in CRRT.

Key Words: Argatroban; Continuous renal replacement therapy (CRRT); Anticoagulant therapy; Acute kidney injury (AKI).

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Impact of All-Cause Mortality in Hemodialysis Patients with Secondary Hyperparathyroidism on Different iPTH Levels after Parathyroidectomy

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Objective: The aim of this study was to determine the impact of all-cause mortality in hemodialysis patients with secondary hyperparathyroidism on different iPTH levels after parathyroidectomy.

Methods: This study was an open, retrospective cohort study design, at China-Japan Friendship Hospital, Hangtian Center Hospital, Dalian Xinhua Hospital, the Fourth Affiliated of Jilin University Hospital and Cangzhou People's hospital's database. Collected 525 hemo-

dialysis patients with secondary hyperparathyroidism whom were candidates for PTX participated in the study, from 2004 to 2014. The inclusion criteria and the principle of perioperative management with reference to China-Japan Friendship Hospital.

Excluded the non-dialysis and renal transplantation patients, as well as the data which was lost or incomplete. Collected the basic information of the patients, Pre-operative and post-operative iPTH levels during different periods, Pre-hemodialysis and post-hemodialysis serum calcium, serum phosphorus and serum alkaline. Recorded of these patients death time and reason after they out of the hospital, and then statistical analysis.

Results: With 11 years following-up, five hospitals have 525 hemodialysis patients with secondary hyperparathyroidism whom were performed PTX. 404 patients conformed to the standard (male 215, female 189), the average age was (47.32 ± 11.52) years, dialysis age was (100.97 ± 54.55) months, pre-operative iPTH was 1950.44 ± 854.42 pg/mL , the average follow-up time was 2.30 ± 2.03 years. Among them, 36 patients was died (8.91%), the reasons are cardiovascular disease (n = 33), cancer (n = 2), infection (n = 1). According to the level of serum iPTH which was one week post-operatively it divided into four groups: A. iPTH ≤ 20 pg/mL (n = 205) (50.7%); B. iPTH 21–150 pg/mL (n = 113) (28.0%); C. iPTH 151–600 pg/mL (n = 55) (13.6%); D. iPTH > 600 pg/mL (n = 31) (7.7%). All-cause mortality in different iPTH level groups, group A was 8.29%, group B was 3.54% ($P = 0.13$), group C was 10.91%, group D was 29.03% ($P < 0.05$), respectively. Among them, the all-cause mortality of group B was the lowest, group D was the highest. Using Cox regression model analysis found that group A for reference (HR = 1) compared to other three groups, the results of HR on group B was 0.57 (95% CI: 0.19–1.72), group C was 1.41 (95% CI: 0.55–3.68), group D was 3.45 (95% CI: 1.49–7.99) which was the highest risk. In addition, post-PTX mortality risk associated with age and dialysis vintage, the risk of HR was 1.06 (95% CI: 1.03–1.09) and 1.0001 ($P < 0.05$, 95% CI: 0.05–1.001), respectively.

Conclusion: Long-term follow-up found that the all-cause mortality was associated with different iPTH level after parathyroidectomy in hemodialysis patients with secondary hyperparathyroidism. Age and dialysis vintage can increased the risk of all-cause mortality. iPTH > 600 pg/mL after PTX was a factor which increased the risk of all-cause mortality. Positively and effectively reduce iPTH levels can reduce the risk of all-cause mortality. Post-PTX the most appropriate level of iPTH was 21–150 pg/mL .

Key Words: Secondary hyperparathyroidism; Parathyroidectomy; Hemodialysis; Intact Parathyroid Hormone.